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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Todd F. BISCHOFF et al.

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Examiner M. J. Daniels

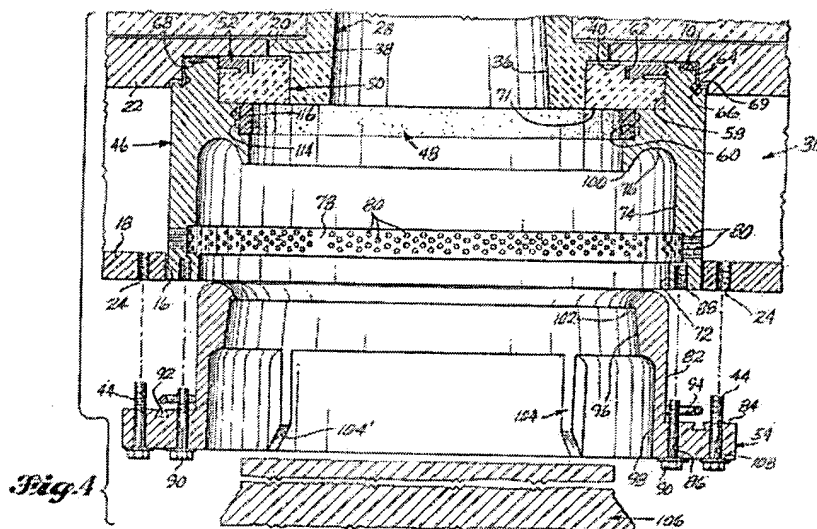
For : METHOD FOR SUPPRESSING REACTION OF  
MOLTEN METALS WITH REFRACTORY MATERIALS

DECLARATION UNDER 37 C.F.R. §1.132

I, ROBERT B. WAGSTAFF, declare that:

I am one of the joint applicants named in the above-identified application, and am a joint inventor of the invention described and claimed therein.

A series of tests was conducted, by me and/or under my direction, using a DC casting apparatus as described in U.S. Patent No. 4,598,763. Specifically, the apparatus contained a refractory ring 50 shown in Figure 4 of the patent (duplicated below).



The refractory ring was made of insulative calcium silicate which, in use of the illustrated apparatus, came into contact with molten aluminum at an inner circumferential portion of the lower surface.

In separate tests, the ring 50 was either untreated, pre-treated with a barium compound, or pre-treated with a strontium compound, and then ring was used in the casting apparatus for casting aluminum alloy AA6061 in the normal manner (178 mm extrusion ingot configuration at typical metal temperatures, casting speeds and water flows of 690°C, 130 mm/minute and 75 liters/minute/mold, respectively). The state of the ring in each case was observed after the casting treatment had been terminated.

For the barium pre-treatment, the ring was immersed in a solution of 10% by weight  $\text{Ba}(\text{OH})_2$  in hot water (50°C) for five minutes and then dried in air at 230°C for 30 minutes.

For the strontium pre-treatment, the ring was immersed in a solution of 10% by weight  $\text{Sr}(\text{OH})_2$  in nearly boiling water, (80-100°C) for five minutes and then dried in air at 230°C for 30 minutes.

The results are shown in the attached Table 1. The Reactivity Index shown in Table 1 is explained in attached Table 2.

It will be seen that the treatments with Ba and Sr resulted in no metal attachment in all cases.

Table 1

Cast Number	Metal Temperature	Casting Speed	Pre-Treatment	Reactivity Index	Comment
1~2	690°C	130 mm/min	None	II	
1~2	690°C	130 mm/min	Ba	I	
1~2	690°C	130 mm/min	Sr	I	
3~4	690°C	130 mm/min	None	IV	Test Suspended
3~4	690°C	130 mm/min	Ba	I	
3~4	690°C	130 mm/min	Sr	I	
5~6	690°C	130 mm/min	None		Test Suspended
5~6	690°C	130 mm/min	Ba	I	
5~6	690°C	130 mm/min	Sr	I	
7~10	690°C	130 mm/min	None		Test Suspended
7~10	690°C	130 mm/min	Ba	I	
7~10	690°C	130 mm/min	Sr	I	
11~20	690°C	130 mm/min	None		Test Suspended
11~20	690°C	130 mm/min	Ba	I	
11~20	690°C	130 mm/min	Sr	I	

Table 2

Reactivity Index	Description	Result
I	Absolutely no metal attachment to the refractory component, smooth surface	No Reaction
II	2 to 6 metal attachments on the refractory component, minor surface imperfections	Some Reaction
III	More than 7 attachments, considerable surface irregularities	Extensive Reaction
IV	Surface tears	Severe Reaction.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

  
ROBERT B. WAGSTAFF

Date: June 22, 2006